

**CRADLE FOR PORTABLE COMMUNICATION DEVICE****PRIORITY**

This application claims priority to an application entitled "CRADLE FOR PORTABLE COMMUNICATION DEVICE", filed in the Korean Intellectual Property Office on April 15, 2003 and assigned Serial No. 2003-23706, the contents of which are incorporated herein by reference.

**BACKGROUND OF THE INVENTION****1. Field of the Invention**

The present invention relates to a cradle for a portable communication device, which is configured so as to be folded or unfolded by a single operation.

**2. Description of the Related Art**

Generally, "portable communication devices" means devices that are portable and enable owners of the devices to communicate in a wireless way. Such portable communication devices generally include a HHP, a CT-2 cellular phone, a digital phone, a PCS phone, a PDA, etc. On the basis of their forms, for example, the portable communication devices may be classified into a bar-type wireless communication terminal, a flip-type wireless communication terminal, and a folder-type wireless communication terminal. The bar-type wireless communication terminal has a single housing, the flip-type wireless communication terminal comprises a bar-type housing and a flip part pivotably attached to the housing, and the folder-type wireless communication

terminal comprises a bar-type housing and a folder part pivotably attached to the housing.

Each of the conventional portable communication devices essentially includes an antenna, data input/output units, and data transmitter/receiver units. Usually, the data input unit is a keypad that is pressed down by fingers to input data. Alternatively, a touch pad or a touch screen may be used.

A display function of data from a data output unit is generally performed by the use of a liquid crystal display (LCD) unit.

Although the portable communication devices have advantages of easy portability due to their small size, and convenient use regardless of location, they also have great risks of loss due to careless use and of damage or breakage thereto caused when the users drop them by mistake. For this reason, the portable communication devices require considerable attention during use.

The portable communication devices have an interface connector at a certain position therein for performing a communication function. The interface connector is connected to a certain external terminal by means of a connection jack for data communication between the portable communication device and the external terminal, for the quality upgrading of the portable communication devices, and for charging the batteries thereof.

When the user uses his/her portable communication device by connecting it to a keypad as an external device, the user usually places it horizontally on a table since there is no means for appropriately standing the portable communication device on the table until now. In such a state wherein the portable communication device is horizontally

placed on the table, it is difficult to confirm inputted data displayed on a liquid crystal display unit of the portable communication device in case of data input. In order to solve this problem, therefore, the user has to perform certain work with his/her only one hand in a state wherein the user grips the portable communication device with the remaining hand, resulting in very troublesome use.

Although cradles for the portable communication devices have been conventionally developed for compensating for the inconvenience of use as stated above, they are configured only for use in cars for the purpose of charging the batteries or for allowing the portable communication devices to be coupled to chargers as external devices. When the portable communication devices are connected to the external devices, therefore, there is a disadvantage in that the portable communication devices have to be separated from their cradles for use.

### **SUMMARY OF THE INVENTION**

Therefore, the present invention has been made in view of the above problems, and it is an object of the present invention to provide a cradle for a portable communication device, which is configured so as to be folded or unfolded by a single operation, thereby facilitating the use of products.

It is another object of the present invention to provide a cradle for a portable communication device, which is configured so as to be folded or unfolded by a single operation, thereby increasing the portability of products.

It is yet another object of the present invention to provide a cradle for a portable communication device, which is formed with a perforated opening for the penetration of

a connection jack, thereby allowing an interface connector provided in the portable communication device to be connected to a certain external device in a state wherein the portable communication device is placed on the cradle.

In accordance with the present invention, the above and other objects can be accomplished by the provision of a cradle for a portable communication device comprising: a front cover onto which the portable communication device is placed; a rear cover provided at the rear surface of the front cover and adapted to support the front cover; a rear plate located at the rear side of the front cover, the rear plate being folded toward or unfolded away from the front cover by a certain angle on the basis of a hinge axis of a hinge assembly provided at an upper end of the front cover; at least one link unit provided between the front cover and the rear plate and adapted to allow the front cover and the rear plate to be folded toward or unfolded away from each other by a certain inclination angle; and the hinge assembly serving to connect the front cover and the rear plate to each other and to enable the rear plate to rotate to or from the front cover.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

Fig. 1 is an exploded perspective view illustrating the inventive cradle for a portable communication device in accordance with an embodiment of the present invention;

Fig. 2 is a perspective view illustrating an unused state of the inventive cradle

for the portable communication device in accordance with the embodiment of the present invention of FIG. 1;

Fig. 3 is a perspective view illustrating an unused state of a link unit as a constitutive component of the inventive cradle for the portable communication device in accordance with the embodiment of the present invention of FIG. 1;

Fig. 4 is a perspective view illustrating a used state of the inventive cradle for the portable communication device in accordance with the embodiment of the present invention of FIG. 1;

Fig. 5 is a perspective view illustrating a used state of the link unit of the inventive cradle for the portable communication device in accordance with the embodiment of the present invention, as shown in FIGS. 1 and 3;

Fig. 6 is a perspective view illustrating the rear surface of the inventive cradle, which is unfolded for bearing the portable communication device in accordance with the embodiment of the present invention, as shown in FIG. 1;

Fig. 7 is a side sectional view illustrating an operating state of the inventive cradle for the portable communication device in accordance with the embodiment of the present invention of FIG. 1;

Fig. 8 is a partially cut-away perspective view illustrating a side sectional surface of the inventive cradle for the portable communication device in accordance with the embodiment of the present invention of FIG. 1; and

Fig. 9 is a perspective view illustrating a usage example wherein the inventive cradle for the portable communication device in accordance with the embodiment of the present invention, as shown in FIG. 1, is connected to an external device by means of a connection jack.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Now, preferred embodiments of the present invention will be described in detail with reference to the annexed drawings. In the drawings, the same or similar elements are denoted by the same reference numerals even though they are depicted in different drawings. In the following description, a detailed description of known functions and configurations incorporated herein will be omitted when it may make the subject matter of the present invention rather unclear. Also, the terms used in the following description are terms defined taking into consideration the functions obtained in accordance with the present invention. The definitions of these terms should be determined based on the whole content of this specification because it may be changed in accordance with the option of a user or a usual practice.

Referring to Figs. 1 to 9 illustrating a cradle for portable communication devices, the cradle, designated as reference numeral 10, comprises a front cover 20, a rear cover 30, a rear plate 40, at least one link unit 50, and a hinge assembly 60. A part of the hinge assembly 60 is provided at the upper end of front cover 20 and the other part thereof at the upper end of the rear plate 40, so as to allow the front cover 20 and the rear plate 40 to be connected to each other as well as to allow the rear plate 40 and the front cover 20 to rotate relative to one another. The front cover 20 is configured so as to allow a portable communication device to be placed on the front surface thereof. The rear cover 30 is provided at the rear surface of the front cover 20 and adapted to support the front

cover 20. The rear plate 40, located at the rear side of the front cover 20, is connected to the front cover 20 so as to be folded toward the front cover 20 or unfolded away from the front cover 20 by a certain angle about a hinge axis A1 of the hinge assembly 60 provided at the upper end of the front cover 20. In order to allow the front cover 20 and the rear plate 40 to be folded toward each other or unfolded away from each other by a certain inclination angle, the link unit 50 is provided between the front cover 20 and the rear plate 40. The link unit 50 includes first 51, second 52 and third 53 links, and a link hinge 54 (FIG. 3).

The front cover 20 is formed with a fitting slot 21, into which a support 51a of the first link 51, having a shape corresponding to the fitting slot 21, is detachably fitted. In a used state of the cradle 10, the support 51a of the first link 51 is adapted to rotate forward so as to be separated from the fitting slot 21. The rear cover 30 is formed with an insertion opening 31, which centrally extends in a lengthwise direction of the rear cover 30 so as to allow the link unit 50 to be inserted therein when the rear plate 40 is folded toward the front cover 20. In such a state wherein the rear plate 40 is folded toward the front cover 20, the link unit 50 is coupled in a coupling opening 41 formed at the rear plate 40 along a center axis of its lengthwise direction. The rear plate 40 is further wholly formed at the surface facing the rear cover 30 with a seating recess 42 defined by the outer rim of the rear plate 40, thereby allowing the rear cover 30 to be seated therein while being surrounded by the outer rim of the rear plate 40 when the rear plate 40 is folded onto the front cover 20.

As stated above, the link unit 50 includes the first to third links 51, 52 and 53, and the link hinge 54. The first link 51 is connected to the front cover 20 by first hinge pieces 54a thereof so that it rotates by a certain angle on the basis of a first hinge axis F1 (FIG. 5) of the first hinge pieces 54a in a state wherein the first hinge pieces 54a are positioned

at certain positions of the front cover 20. The first link 51 is connected to one end of the second link 52 by means of a second hinge piece 54b to be positioned at one end of the first link 51. The other end of the second link 52 is connected to the rear plate 40 by a third hinge piece 54c provided at a certain position of the rear plate 40. In this configuration, the second link 52 can rotate by a certain angle about second and third hinge axes F2 and F3 (FIG. 5) of the second and third hinge pieces 54b and 54c. The third link 53 is connected at its one end to the second link 52 by means of the third hinge piece 54c (FIG. 5). The other end of the third link 53 is connected to the rear surface of the front cover 20 by a fourth hinge piece 54d thereof to be positioned at a certain position of the front cover 20. Further, the third link 53 is provided at the center portion thereof with one of fifth hinge pieces 54e and adapted to move about a fifth hinge axis F5 (FIG. 5) of the fifth hinge pieces 54e. According to the movement thereof, the third link 53 is adapted to support the front cover 20 and the rear plate 40, which are folded toward or unfolded away from each other by a certain inclination angle. At a certain position of the third link 53 is formed a pair of holes 53a, which are symmetrically arranged relative to an axis of symmetry of the third link 53 and opposite each other and have a specific contour for allowing both opposite ends of the support 51a formed at the first link 51 to be smoothly coupled therein, as better seen in FIG. 3.

Considering the link hinge 54 of the link unit 50, as apparent from the above description, it includes the first to fifth hinge pieces 54a, 54b, 54c, 54d and 54e. The first hinge pieces 54a extend outwardly from certain opposite positions along a horizontal center axis of the first link 51 so as to be positioned at certain positions of the front cover 20 for the rotation of the first link 51. The second hinge piece 54b, positioned at the first link 51, serves to connect the one end of the first link 51 to the one end of the second link 52 and allow the first and second links 51 and 52 to rotate by a certain angle. The third hinge piece 54c, provided at the rear plate 40, serves to connect the other end of the



second link 52 to the one end of the third link 53 and allows the second and third links 52 and 53 to rotate by a certain angle. The fourth hinge piece 54d is provided at the other end of the third link 53 so as to be positioned at a certain position of the front cover 20 for the rotation of the third link 53. The fifth hinge pieces 54e are positioned at a certain central position of the third link 53 to define two sub-links having their inner ends pivotally coupled to one another and rotatable about the fifth hinge axis F5. Accordingly, as the front cover 20 and rear plate 40 rotate relative to one another about the hinge axis A1 between the positions shown in FIGS. 2 and 4, the inner ends of the sub-links rotate and move vertically, as indicated by an arrow V (FIG. 7).

The first link 51 is provided at the upper portion thereof with the support 51a, which serves to sustain a portable communication device thereon. The lower portion of the first link 51 is connected to the second link 52 by means of the second hinge piece 54b for the rotation of the first link 51. Further, the support 51a of the first link 51 is formed at the center portion with a perforated opening 51b for the penetration of a connection jack 200, which connects the portable communication device placed on the cradle 10 to a keypad 300 (FIG. 9) as an external device. The first link 51 is adapted to rotate forward from the front cover 20 up to an angle  $\theta_1$  of about  $90^\circ$  (FIG. 7), and the third link 53 is adapted to rotate up to an angle  $\theta_2$  of about  $180^\circ$  (FIG. 7) so as to support the front cover 20 and the rear plate 40 when they are unfolded by a certain inclination angle.

The operation of the cradle for the portable communication device in accordance with a preferred embodiment of the present invention as stated above will be described in detail with reference to the accompanying drawings.

As shown in Figs. 1 to 3, the cradle 10 for portable communication devices

comprises the front cover 20, the rear cover 30, the rear plate 40, the link unit 50 and the hinge assembly 60.

In this case, the rear cover 30 is positioned at the rear surface of the front cover 20 for supporting the front cover 20.

As shown in Figs. 4 and 5, in a used state of the cradle 10, the rear plate 40 is unfolded away from the front cover 20 by a certain inclination angle on the basis of the hinge axis A1 of the hinge assembly 60 provided at the upper ends of the front cover 20 and the rear plate 40.

In this case, as shown in Fig. 6, by virtue of the at least one link unit 50 provided between the front cover 20 and the rear plate 40, the front cover 20 and the rear plate 40 can be folded toward or unfolded away from each other within a certain inclination angle range.

As shown in Fig. 7, the first link 51 of the link unit 50 is connected to the front cover 20 by means of the first hinge pieces 54a located at certain positions of the front cover 20 so that it rotates forward from the front cover 20 by the angle  $\theta 1$  of about  $90^\circ$  about the first hinge axis F1 of the first hinge piece 54a.

In this case, the one end of the first link 51 is connected to the one end of the second link 52 by means of the second hinge piece 54b, and the other end of the second link 52 is connected to the third hinge piece 54c provided at a certain position of the rear plate 40.

According to the above connection structure, as the first link 51 rotates, the

second link 52 rotates by a certain angle on the basis of the second hinge axis F2 of the second hinge piece 54b.

At this time, the third hinge piece 54c connected to the other end of the second link 52 rotates organically.

To the third hinge piece 54c connected to the other end of the second link 52 is connected the one end of the third link 53, and the other end of the third link 53 is connected to the rear surface of the front cover 20 by means of the fourth hinge piece 54d positioned at a certain position of the front cover 20.

As shown in Fig. 7, as the first and second links 51 and 52 rotate, the third link 53 rotates upward and downward on the basis of the fifth hinge axis F5 of the fifth hinge pieces 54e provided at the center portion of the third link 53. After rotating across the angle  $\theta$  2 of  $180^\circ$ , the folded third link 53 is unfolded horizontally.

In this case, as shown in Fig. 8, the first to third links 51, 52 and 53 support the front cover 20 and the rear plate 40 in a state wherein the rear plate 40 is unfolded away from the front cover 20 by a certain inclination angle.

As shown in Fig. 9, the portable communication device 100 is placed on the support 51a formed at the upper portion of the first link 51.

Here, the support 51a is formed at the center portion with the perforated opening 51b for the penetration of the connection jack 200, which is connected to the keypad 300 as an external device. Therefore, the connection jack 200 is connected to an interface connector provided in the portable communication device, designated as reference

numeral 100, after penetrating the perforated opening 51b.

As a result, the user can directly connect the portable communication device 100 with the keypad 300 of the external device without separating the portable communication device 100 from the cradle 10.

In a unused state of the cradle 10, as the front cover 20 and the rear plate 40 are folded toward each other so that they come into contact with each other, the first link 51 is inserted into the insertion opening 31 formed at the rear cover 30 by rotation, and at the same time, the second link 52 is coupled into the coupling opening 41 formed at the rear plate 40.

In this case, the first link 51 is inserted into the lower portion of the insertion opening 31, and the second link 52 is coupled into the lower portion of the coupling opening 41.

Further, as the center portion of the third link 53 moves upward while rotating about the fifth hinge axis F5 of the fifth hinge pieces 54e, one portion of the third link 53 is inserted into the upper portion of the insertion opening 31, and the other portion of the third link 53 is coupled into the upper portion of the coupling opening 41.

As apparent from the above description, the present invention provides a cradle for portable communication devices, which is configured to be folded or unfolded by a single operation, resulting in great convenience in use and portability of the cradle.

Although the cradle for portable communication devices according to the present invention has been disclosed for illustrative purposes, those skilled in the art will

appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.